SECTION 704

LIGHTWEIGHT (LOW MASS DENSITY) CONCRETE MASONRY CONSTRUCTION CLASS X CONCRETE

704.1 Description. This work shall consist of constructing structures of lightweight (low mass density) concrete, designated as Class X Concrete, composed of a mixture of cement, fine aggregate, lightweight (low mass density) fine and coarse aggregate, water and approved additives.

704.2 Material.

704.2.1 All material shall conform to Division 1000, Materials Details, and specifically as follows:

Item	Section
Fine Aggregate	1005.2
Lightweight (Low Mass Density) Fine and Coarse Aggregate	1005.3
Cement	1019
Concrete Admixtures	1054
Water	1070

The lightweight (low mass density) concrete shall be proportioned, mixed and transported in accordance with the applicable provisions of Sec 501. Each kind and size of aggregate shall be stored and proportioned separately.

704.2.2 Mix Design. The proportions of cement, fine aggregate and lightweight (low mass density) fine and coarse aggregates will be specified by the engineer within the limits of these specifications. Unless otherwise approved by the engineer, Grade 5 lightweight (low mass density) coarse aggregate shall be used. Twenty to 40 percent by volume of the fine aggregate shall be material naturally produced by the disintegration of rock of a siliceous nature and shall meet the requirements of Sec 1005.2 with the gradation requirements of Sec 1005.2.4.1. Class C or D sand, as defined in Sec 501.2.2.3, shall not be used. The weight (mass) of freshly mixed Class X Concrete shall not be greater than 120 pounds nor less than 105 pounds per cubic foot (1920 nor less than 1680 kg/m^3). The mixture shall have a slump, when placed, of not more than 2 inches (50 mm). If air-entrained concrete is specified, the entrained air content shall be 7 percent by volume, with an operating tolerance of plus or minus two percentage points.

704.2.2.1 The cement content shall be 696 pounds per cubic yard (415 kg/m^3), plus or minus 19 pounds (10 kg), as determined by using the batch weights (masses) and the weight per cubic foot (mass per cubic meter) of the fresh concrete in accordance with AASHTO T 121. High early strength cement may be used as provided for in Sec 501.7.

704.2.3 Concrete Admixtures. Air-entraining admixtures, retarding admixtures, or water-reducing admixtures may be specified or may be permitted as set forth in Sec 501. If used, these admixtures shall be proportioned, dispensed and mixed in accordance with Sec 501.

704.2.4 Trial Batches. Prior to placement of any concrete in the work, the contractor may be required to prepare trial batches for tests. They shall be prepared sufficiently in advance of placing concrete in the structure to permit determination of the seven day compressive strength of the concrete, or for such other tests as may be determined by the engineer. Generally, three trial batches, of not less than 2 cubic yards (1.5 m^3) each, shall be mixed for testing. The batches shall be mixed in accordance with Sec 704.3.2 and agitated in such manner to reproduce the time of haul and discharge time.

704.3 Construction Requirements. The following requirements shall be in effect except as may be modified by an approved alternate submitted by the contractor.

704.3.1 Aggregates. Storage of aggregates shall, in general, be in accordance with Sec 501.5.3. A moisture sensing device in the fine aggregate bins or weighing hopper will not be required.

704.3.1.1 All lightweight (low mass density) aggregates shall be stockpiled on the job or at a central batching plant for not less than 24 hours prior to use in the batches. Aggregates shall be stored in floored bins adjacent to the proportioning plant. The aggregates shall be pre-wetted and drained to a uniform moisture content meeting the approval of the engineer. Stockpiles shall be protected to prevent excessive evaporation of moisture after wetting. Wetting of stockpiles shall be done not less than 12 hours prior to use.

704.3.2 Mixing. While the mixer is in motion, it shall be charged with approximately one-half of the water and all the aggregate required for a batch. The aggregate and water shall be mixed at least one minute, after which the cement shall be added gradually. Additional water shall be added as required to produce the desired consistency. The mixing shall be continued for not less than five minutes after the entire batch is in the mixer. Some modification of the usual water measuring and dispensing equipment may be necessary to meet the requirements of these specifications. The consistency of the concrete mixture shall be kept uniform and the minimum quantity of water shall be used which will produce the desired workability. If central or truck mixed concrete is furnished, all batches shall be mixed ten additional revolutions at mixing speed immediately prior to discharge from the hauling unit. Central or truck mixed lightweight (low mass density) concrete shall be delivered to the site of the work and discharge completed within one hour after beginning of mixing operations.

704.3.3 Placement. Forming, placing, finishing and curing shall be in accordance with the applicable portions of Sec 703. The concrete shall be placed by starting at one corner and along the header, vibrating the placed concrete uniformly and thoroughly, but not to such extent as to segregate the mixture. Additional concrete shall be placed on top of the leading edge of the concrete previously placed, and shall be adequately vibrated to consolidate the mixture under and around the reinforcing steel in such manner that the mixture will flow along the bottom of the form and come up around the reinforcing steel.

704.4 Method of Measurement. Class X Concrete will be computed from the dimensions shown on the plans, or as revised in writing by the engineer, and will be measured to the nearest 1/10 cubic yard (0.1 m^3) for each structure. No deduction will be made for the space occupied by reinforcing steel or conduit. Final measurement will not be made except for authorized changes during construction, or where appreciable errors are found in the contract quantity. The revision or correction will be computed and added to or deducted from the contract quantity.

704.5 Basis of Payment.

704.5.1 The accepted quantity of Class X Concrete will be paid for at the contract unit price. No direct payment will be made for surface sealing, furnishing and placing joint material,

water stops or flashing and other incidental construction attached to or incorporated in the concrete masonry.

704.5.2 Payment for trial batches directed by the engineer in accordance with Sec 704.2.4 will be made at 50 percent of the contract unit price for Class X Concrete.